

Use of the Actinide-CU[®] Resin for Preconcentration of Am and Pu in Analysis of Human Tissues

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The use of the Actinide-CU[®] resin (ElChroM Industries) as a preconcentration step in the determination of human tissues has been investigated. Conditions for the use of the Actinide-CU[®] resin for preconcentrating actinides of Am and Pu in bone tissue and the typical soft tissues liver and lung have been determined. Determination of ²⁴²Pu and ²⁴¹Am in the eluate from the column by liquid scintillation counting (LSC) indicate that the retention of Am and Pu in these tissue solutions by the A-CU column and the elution from the resin is quantitative. Incomplete decomposition of the actinide-diphosphonate complexes (Am and Pu) from A-CU column causes poor recoveries in the electrodeposition step in routine alpha spectrometry analysis. This problem was solved by using 30% H₂O₂ and concentrated HNO₃ with NaVO₃ to oxidatively decompose the complexes. The preconcentrated Pu plus Am fraction is then separated using ion exchange (AG1-X4 resin) to separate and purify the Pu fraction and solvent extraction (DDCP) followed by AG MP-1 column or extraction chromatography (TRU[®]) to separate and purify the Am fraction. An average recovery of Pu of 84% and an average recovery of Am 89% were obtained using this method, determined by alpha spectrometry. The results indicate that the A-CU resin can be used in combination with other chemical procedures in the USTUR Radiochemical Program. A set of USTUR verified human bone tissue and human soft tissues were used to establish the validate method. Results obtained from this work show no significant differences to the verified values (1 standard deviation). Thus, from this study, it was found that: the Actinide-CU resin is effective for preconcentrating actinides in sample solutions of human tissues.

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